

added. The anode chamber is filled with acid (1:30), the anode inserted and electrolysis started. The temperature is raised to 80°C. The current employed is about 8 amperes, while the voltage drop across the cell is 8 volts. Under these conditions 0.5 gram iron is reduced to the ferrous condition in 60 to 70 minutes. After a drop test with thiocyanate shows that reduction in the cathode chamber is complete, the current is stopped, the anode chamber acid is added to the main solution and, after refilling the anode chamber, the electrolysis is continued 10 minutes. At the end of this time the cathode liquid is titrated with permanganate.

It will be seen that the method as carried out is not particularly rapid. On the other hand its favorable features are: (1) nothing is introduced into the solution that may carry impurity, and (2) conditions need be defined only within wide limits. The accuracy of the method can only be determined by more extensive comparison with reductions by other methods. The precision attainable under the best conditions is shown in Table I and II. Under ordinary conditions a precision of better than 1 part in 200 or 300 can not be expected until after the method has been more completely developed.

HELMINTHOLOGY.—*New nematode genera found inhabiting fresh water and non-brackish soils.* N. A. COBB, Bureau of Plant Industry. Communicated by Walter T. Swingle.

The following pages give the characters of twenty-six proposed new nematode genera, as well as those of a type species for each genus.

Seventy-three per cent of these genera are found in arable soils in various parts of the world. Nearly half of them have come to light thru a study of the soils of the Arlington Farm of the United States Department of Agriculture, located on the Potomac River, in Alexandria County, Virginia, directly opposite Washington, D. C. In the following pages wherever the word "Arlington" is used, it refers exclusively to this farm. As this farm is close to the District of Columbia, and its soils similar to those of the District, it may be assumed that all the species

found at Arlington occur in the District of Columbia, and probably also in adjacent parts of Maryland and Virginia.

Nine-tenths of the proposed genera are due to the discovery of new forms; the others are proposed on the basis of later investigations of species earlier made known, and assigned, with some doubt, to existing genera. A number of the genera are known to the writer to contain numerous species, and in such cases it has been possible to select as a type species one already known to be thoroly representative of a well defined generic group.

Most of these genera are injurious to vegetation, and many of them contain species that are very abundant and widespread. The morphology, physiology, life-history, distribution and economic relationships of the species belonging to these genera will be treated in a separate publication.

The following diagram illustrates the nature of the formula used in the tabulation of the various necessary measurements:

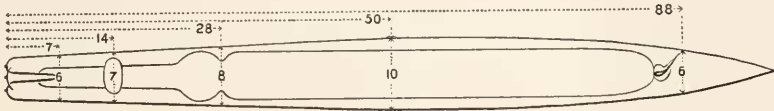


Fig. 1. Diagram of the descriptive decimal formula used for nematodes; 6, 7, 8, 10, 6 are the transverse measurements, while 7, 14, 28, 50, 88 are the corresponding longitudinal measurements. The formula in this case is:

$$\begin{array}{cccccc} 7. & 14. & 28. & 50. & 88. & \\ 6. & 7. & 8. & 10. & 6. & \end{array}$$

The unit of measurement is the hundredth part of the length of the body, whatever that may be. The measurements become, therefore, percentages of the length. The absolute length is given in millimeters as a final non-paired term.

The measurements are taken with the animal viewed in profile; the first are taken at the base of the pharynx, the second at the nerve-ring, the third at the cardiac constriction or end of the neck, the fourth at the vulva in females and at the middle (M) in males, the fifth at the anus.

Owing to the fact that the measurements vary somewhat with varying technique, a brief note as to the method of fixation and

## KEY AND CHARACTERS

The following characters are common to all known species of these twenty-six proposed new genera: pharynx present, all known males have two equal spicula; no bursa, except in *Eutylenchus*, *Diploscapter*, and *Isonchus*; no eye-spots.

			NEW GENERA	
<b>MOUTH ARMED WITH AN AXIAL</b>	no spinneret; quite naked, (Exc. 2 & 3).			
<b>Spear</b> <i>bulbed</i> at base, 1-3% of body-length (Exc. 1&4); no amphids (Exc. 1&6).				
Canal Dorylaimoid *amphids stirrupform; Hd. papillate.	-d- 'q' ***		XIPHINEMA	1
Canal Tylenchoid; **spear 6-20% of body-length in <i>Iota</i> .				
Cephalic setae four; striae coarse; renette present.				
Bursa none; skin grooved lengthwise; no lips.	-d- 'q'		ATYLENCHUS	2
Bursa ribless; skin not grooved; lips 3.	-d-		EUTYLENCHUS	3
Cephalic setae none; renette present, doubtful in 5&7.				
Striae huge, retrorse; oesophageal bulbs faint.	-d- 'q'		IOTA	4
Striae fine (or none in 6); has oesophageal swellings.				
Head somewhat beaklike, lipless; renette present.	-d- 'q'		TYLENCHORHYNCHUS	5
Head as usual, not beaklike; renette (pore) present.				
Lips papillate; spear diffuse; amphids slitlike.	-d? 'q'		ARCHIONCHUS	6
Lip-region helmeted; spear obvious; no lips or papillae.	-d- 'q'		NEMONCHUS	7
<b>Spear</b> <i>plain</i> , amphids stirrupform (unknown in 8&11); no renette (Exc. in 8).				
Canal Tylenchoid; **striae coarse; lipless; bursa ribbed.	-d- 'q'		ISONCHUS	8
Canal Dorylaimoid; *striae fine (or 0); lips 6 (0 in 14), bi-papillate.				
Vestibule broad; spear acute, cylindrical.				
Lip region discoid, much expanded.	'q'		DISCOLAIMUS	9
Lip region not discoid; d's with 2 anal papillae side by side.				
Labial ribs uniform, not grouped; lips united.	-d- 'q'		ACTINOLAIMUS	10
Labial ribs in groups, lips distinct.	'q'		ANTHOLAIMUS	11
Vestibule small or none.				
Lip region protrudable.	-d- 'q'		DORYLAIMELLUS	12
Lip region not protrudable.				
Spear conoid, short, toothlike.				
Spear slender, very long, 40% of neck, flexible.	-d- 'q'		NYGOLAIMUS	13
<b>MOUTH WITHOUT SPEAR.</b> Striated (Exc. 6&26). Labiate (Exc. 21).			TRICHODORA	14
<b>Pharynx</b> <i>armed</i> with a tooth, conoid or pyramidal (Exc. 16).				
Tooth spearlike; no renette or spinneret; no setae (Exc. 15&17).				
Alimentary canal Dorylaimoid; **lips bi-papillate.			NYGOLAIMUS	13
Alimentary canal Tylenchoid; *lips mono-papillate.	'q'		ARCHIONCHUS	6
Tooth not spearlike, obscure in 16.				
Striae resolvable into elements.				
Oesophagus bulbed; has setae, spinneret & renette.	'q'		ACHROMADORA	15
Oesophagus plain; no setae or renette.	'q'		CRYPTONCHUS	16
Striae not further resolvable; spinneret present; lips papillate.				
Cephalic setae ten; renette unknown.	'q'		NANNONCHUS	17
Cephalic setae none.				
Lips bi-papillate; amphids stirrupform; no renette.	'q'		OIONCHUS	18
Lips not bi-papillate; amphids elliptical; no renette.	'q'		UDONCHUS	19
<b>Pharynx</b> <i>unarmed</i> , prismoid (Exc. 24&26); spinneret (Exc. 20&23).				
Neck Rhabditoid, i.e. with median & cardiac bulbs.				
Renette present; "diggers" on Hd.; no spinneret.	'd- 'q'		DIPLOSCAPTER	20
Renette unknown; no "diggers"; spinneret present.	-d- 'q'		HALIPLECTUS	21
Neck not Rhabditoid, (no median bulb)				
Head with empty expansions or bladders; has renette.	'q'		WILSONEMA	22
Head without chitinous bladders.				
Amphids none; skin not striated; renette unknown.	-q		GYMNOLAIMUS	23
Amphids and spinneret present, fine striae, or none.				
Cardiac bulb present, amphids not spiral; has renette.	'q'		CHRONOGASTER	24
Cardiac bulb none or rudimentary.				
Amphids spiral, renette present, lips 3, faint, flat.	'q'		ANONCHUS	25
Amphids transv. slits; no renette; lips 3, massive, conoid.	'q'		TRISCHISTOMA	26

\* Oesophagus without bulbs, posterior portion much the wider; intestine with a distinct short segment in front of the rectum, - the pre-rectum

\*\* Oesophagus with median and with cardiac bulbs, intestine without pre-rectum.

*** 'q', ovaries two and reflexed.	-q	ovary single, in front & outstretched.
-q-, ovaries two and outstretched.	-d-	testes two and outstretched.
'q', ovary single, in front & reflexed.	-d-	testis single, in front & outstretched.

DESCRIPTIONS OF TWENTY-TWO NEW SPECIES  
PROPOSED AS TYPES IN CONNECTION WITH THE FOREGOING NEW GENERA.

Part of the descriptive matter is given in key-form for the sake of brevity, and for the purpose of exhibiting relationships not shown in the foregoing key. The following characters are held in common. Excretory pore, when present, just behind the nerve-ring. Spicula arcuate, - strongly so in *Trichodora*, slightly so in *Nannonchus* and *Isonchus*.

## NEW SPECIES

- Striae 200 or less; contour crenate or serrate; head rounded.  
Lip region mobile; male never losing the spear. -♂ -♀ A. *decalineatus* 2  
Lip region fixed; male losing the spear at final moult. -♂ -♀ I. *squamosum* 4  
Striae 200+, or none, plain, (Exc. 16); contour entire (Exc. 21).  
Tail broad, end rounded; head rounded; lips not set off (Exc. 18).  
Form of tail cylindroid, at least in the female.  
Median bulb  $\frac{1}{2}$  wide as neck; Post. bulb elongated-pyriform. -♂ -♀ T. *cylindricus* 5  
Median "  $\frac{1}{3}$  wide as neck; " " indefinite; Hd. continuous -♂ -♀ I. *radicolus* 8  
Form of tail somewhat hemispheroid.  
Head expanded, armored with strong, chitinous framework. -♂ -♀ N. *galeatus* 7  
Head not armored, continuous.  
Post. half oesophagus cylindrical,  $\frac{3}{5}$  wide as neck. '♀ O. *obtusus* 18  
Post. part oesophagus clavate, hardly half as wide as Nk. -♂ '♀ T. *obtusa* 14  
Tail more or less conoid; head continuous; lips often set off.  
Conoid, no part cylindroid; not acute, (Exc. ♀'s of 10).  
Terminus slightly swollen; head rounded; lips not set off. '♀ U. *tenuicaudatus* 19  
Ceph. setae 0; lips faint, 6(?); spinneret conoid, obtuse. '♀ T. *pellucida* 26  
Ceph. setae 6(?); subceph. 4; lips huge, with terminal flaps. '♀ T. *pellucida* 26  
Terminus not swollen, rounded (Exc. 21, 22); Hd. rounded (Exc. 9, 11, 13).  
Dermal pores throughout the body; lips set off in 11 only. '♀ A. *truncatus* 11  
Pores in lateral rows of about 100; tail convex-conoid. -♂ -♀ H. *pellucidus* 21  
Pores in submedian rows of about 140; tail conoid. -♂ -♀ H. *pellucidus* 21  
Dermal pores none.  
Head with either setae or elaborate appendages.  
Appendages 4 slender setae,  $\frac{1}{2}$  long as head is wide. '♀ C. *gracilis* 24  
Appendages elaborate dorsal & ventral double "combs". '♀ W. *capitatum* 22  
Head naked; known ♂'s with supplementary organs  
Cephalic papillae 6; lips not set off by constriction.  
Tooth minute, at base of tubular pharynx; tail conoid. '♀ C. *nudus* 16  
Tooth protrudable, its apophyses bulbous; tail convex-conoid '♀ A. *perplexans* 6  
Cephalic papillae 12; amphids very near lip region. '♀ A. *perplexans* 6  
Labial region discoid, set off by deep constriction. '♀ D. *texanus* 9  
Labial region not discoid.  
Lips 6, region set off by a distinct constriction.  
Oesophagus with small bulb near spear; tail conoid. -♂ -♀ D. *virginianus* 12  
Oesophagus strictly Dorylaimoid; tail convex-conoid. N. *japonicus* 13  
Lips 0, region not set off by distinct constriction.  
Pharynx a 6-ribbed cup; supplementary organs, fascicles -♂ -♀ A. *radiatus* 10  
Pharynx a tubular spear-guide; " " not " -♂ -♀ X. *americanum* 1  
Conoid, then cylindroid; head rounded.  
Oesophagus plain; spiral amphs. opp. base of pharynx; ♂ tail setiferous.  
Setae 10,  $\frac{1}{2}$  long as Hd. is wide; ♂ supplementary organs 0. '♀ N. *granulosus* 17  
Setae 4,  $\frac{1}{2}$  long as Hd. is wide; supplementary organs tubular '♂ '♀ A. *monhystera* 25  
Oesophagus bulbous; amphids elliptical; tail naked. '♀ U. *tenuicaudatus* 19

The following previously described species are proposed as type species for four new genera. These four species were first discovered and described by the writer, and assigned, doubtfully, to existing genera. Later investigations render it advisable to propose new genera for their reception, as follows:—

Old name	Literature citation.	New name here assigned
1. <i>Aulclaimus exilis</i> , Cobb.	Cobb, <u>Macleay Memorial</u> Volume, Sydney, 1893.	<i>Gymnolaimus exilis</i> (Cobb)
2. <i>Chromadora minima</i> , "	"	<i>Achromadora minima</i> , "
3. <i>Rhabditis coronata</i> , "	"	<i>Diploscapter coronata</i> , "
4. <i>Tylenchus setiferus</i> , "	Agr. Gazette, N. S. W., 1893.	<i>Eutylenchus setiferus</i> , "

preservation is inserted near the end of each description. In most cases the formulae given represent an average derived from the measurement of several adult individuals.

By the use of suggestive conventional signs the formula is made to convey considerable additional information. Thus the following formula

$$\{ \text{---} \circ \overset{35}{1.5} \dots \overset{7.5}{2.4} \dots \overset{18.5}{2.9} \dots \overset{50}{4.5} \dots \overset{96.5}{2.5} \dots 1.8 \text{ mm.}$$

indicates that:

The cuticle is traversed by rather coarse transverse striae,<sup>1</sup> which are resolvable into rows of dot-like markings,<sup>2</sup> and is traversed longitudinally by wings,—one on each side of either lateral line.<sup>3</sup> The head bears lips, each of which is armed with two papillae. There are ten cephalic setae,—two of unequal size on each submedian line, and one on each lateral line. The tubular pharynx is armed with a spear, which is bulbous at the base. Spiral amphids are present.<sup>4</sup> The excretory pore is located just in front of the nerve-ring.<sup>5</sup> The oesophagus bears two bulbs: a median bulb half as wide as the corresponding portion of the neck, and a cardiac bulb well filling the base of the neck.<sup>6</sup> The tail end is armed with caudal glands,<sup>7</sup> The two ovaries are outstretched in opposite directions and occupy 35 per cent of the length of the body.<sup>8</sup>

1. *Xiphinema americanum*, n.g., n.sp.

$$\begin{aligned} (\text{---} \circ \overset{.3}{.6} \overset{(8.5)}{(1.8)} \dots \overset{12.4}{1.9} \dots \overset{16.5}{2.5} \dots \overset{54}{2.1} \overset{98}{1.3} \dots 1.7 \text{ mm.} \\ (\text{---} \circ \overset{.3}{.6} \overset{(7.)}{(1.5)} \dots \overset{8.8}{1.6} \overset{16.2}{1.7} \dots \overset{M}{1.9} \overset{97.9}{1.3} \dots 2. \text{ mm.} \end{aligned}$$

Papillae minute. Anterior three-fourths of the spear about as thick as cuticle; posterior two-fifths twice as thick. Spear bulb about one-fourth as wide as neck.

<sup>1</sup> Formula line of coarse dots. Fine dots mean fine striae; plain line, no striae.

<sup>2</sup> Dots above and below formula line between 2nd and 3rd terms.

<sup>3</sup> Short lines above and below formula line between 2nd and 3rd terms.

<sup>4</sup> Indicated in conventional sketch at left of formula.

<sup>5</sup> Oblique line in front of nerve-ring measurement.

<sup>6</sup> Underscoring the 2nd and 3rd diametral measurements, thus indicating the presence of a bulb at that point. Length of mark indicates size of bulb.

<sup>7</sup> Mark at right hand end of formula line.

<sup>8</sup> Dashes before and after 50, and 35 used as "exponent."

NOTE. Absence of any particular mark indicates the absence of that particular feature, so far as at present known.

Anterior three-fifths of the oesophagus tubular, coiled, uncoiling when spear is thrust out; posterior two-fifths half as wide as the neck. Ventral row of about seven innervated, slightly elevated supplementary organs occupying a space about four times as long as the tail. Spicula arcuate, rather stout, swollen in the middle, tapering both ways; proximal ends hardly cephalated. Accessory pieces present. Flemming to glycerine. The measurements in parentheses are taken at the base of the spear.

Habitat; distribution. About the roots of a variety of plants,—corn, grass, citrus trees, on the Atlantic and Pacific slopes of the United States.

Genus represented in many parts of the world. Known to the writer from North and South America, Europe, Asia, and Oceania. There are beyond doubt dozens of species, possibly hundreds. Form usually more slender than in *Dorylaimus*.

2. *Atylenchus decalineatus*, n.g., n.sp.

♂ =  $\frac{3.1}{2.1} \dots \frac{12.4}{2.3} \dots \frac{18.2}{2.9} \dots \frac{21}{2.9} \dots \frac{86.}{1.9}$  .6 mm.  
 ♀ =  $\frac{2.7}{1.9} \dots \frac{11.4}{2.2} \dots \frac{17.4}{2.4} \dots \frac{M^{45}}{2.8} \dots \frac{90.}{2.2}$  .6 mm.

Striae about 200; interrupted by ten longitudinal grooves. Setae near the margin of the head, slender, spreading, nearly as long as the head is wide. Spear acute,

shaft half as wide as the adjacent annules; its bulb twice as wide. Median bulb ellipsoidal, half as wide as the neck with small valve; posterior swelling oblong, half as wide as the neck, without valve. No supplementary organs or special male papillae or setae. Spicula arcuate, one and one-third times as long as the anal body diameter, tapering; constricted slightly at the proximal end. Hot sublimate to balsam.

Habitat; distribution. On roots of cranberries (*Oxycoccus macrocarpus*), Cranberry bog, New Lisbon, New Jersey, Atwood Grove, Fla.

3. *Eutylenchus* n. g. *setiferus* (Cobb) n. Comb.

♂ =  $\frac{2.5}{1.7} \dots \frac{10.4}{2.2} \dots \frac{15.2}{2.3} \dots \frac{M}{2.4} \dots \frac{85.}{2.6}$  .7 mm.  
 Measured fresh.

Amphids unknown. Caudal glands probably absent. Supplementary

organs absent. Other characters as given in the original description of the species. (Agricultural Gazette of New South Wales, Vol. IV, Part 10, Oct., 1893.)

Habitat; distribution. Genus here established for the reception of the writer's *Tylenchus setiferus*, found about the roots of plants in Northern New South Wales, Australia. *Tylenchus setiferus*, Cobb, thus becomes the writer's *Eutylenchus setiferus*.

4. *Iota squamosa*, n.g., n.sp.

♂ =  $\frac{.7}{2.6} \dots \frac{(15.1)}{(7.1)} \dots \frac{20.4}{7.2} \dots \frac{23.4}{7.3} \dots \frac{25}{5.3} \dots \frac{96.}{3.9}$  .8 mm.  
 ♀ =  $\frac{.7}{1.6} \dots \frac{(18.1)}{(3.4)} \dots \frac{2.4}{2.4} \dots \frac{22.4}{3.5} \dots \frac{37}{4.4} \dots \frac{94.}{2.7}$  .8 mm.

Striae about 150, each subdivided, and consisting of eight squamules. Spear one-third as wide as one of the annules, posterior fourth twice as wide; bulbous base one-

third as wide as the neck. Tail convex-conoid, of nine annules. Vulva between the twelfth and thirteenth annules. No male supplementary organs or papillae. Spicula twice as long as the anal body-diameter, slender, tapering, acute,

proximal third a little wider and uniform. Flemming to glycerine. The measurements in parentheses are taken at the base of the spear.

Habitat; distribution. Roots of Mango, Bangalore, India. The genus *Iota* is widespread in acid soils, swamps, bogs, etc., and doubtless contains many species, a number of which are known to the writer from various parts of the United States, Europe, Australia and Oceanica. The males, in some species at least, at the final moult, become much longer and slenderer, and lose the oral spear. Many species only about 0.5 mm. long; relatively very wide and inflexible, with coarse retrorse annules.

5. *Tylenchorhynchus cylindricus*, n.g., n.sp.

$$\left( \begin{array}{ccccccc} .9 & 11.6 & 17.8 & -57 & 94.3 & & \\ :9 & 3.2 & 3.5 & 3.1 & 3.1 & .7 & \text{mm.} \end{array} \right.$$

$$\left( \begin{array}{ccccccc} .6 & 10.4 & 16.1 & -M & 94.8 & & \\ :9 & 2.4 & 2.4 & 2.5 & 2.1 & 1. & \text{mm.} \end{array} \right.$$

Wings indicated by two longitudinal lines. Head with minute six-ribbed, chitinous, yellowish framework with indistinct posterior equatorial

band. Spear minute, barely knobbed at base. Median bulb prolate, half as wide as the neck with an obscure elongated valve; cardiac swelling pyriform, three-fourths as wide as the neck. Excretory pore—uncertain. Hot sublimate to balsam.

Habitat; distribution. A single species from the soil of reclaimed coastal swamp lands, Southern California.

6. *Archionchus perplexans*, n.g., n.sp.

$$\left( \begin{array}{ccccccc} 4.2 & 13.2 & 25. & 57 & 94.8 & & \\ :3.6 & 4. & 4.1 & 4.7 & 2.9 & .6 & \text{mm.} \end{array} \right.$$

$$\left( \begin{array}{ccccccc} 3.8 & 12. & 24. & -M & 95.4 & & \\ :2.8 & 3.5 & 3.7 & 4.3 & 3.1 & .6 & \text{mm.} \end{array} \right.$$

Papillae marginal, spreading. Amphids transverse, half as long as the head is wide. Pharynx twice as deep as head is wide; surrounded by distinct, massive,

muscular sac, set off from the oesophagus by a constriction. Spear tooth-like at the end of large, tubular apophysis, which is prominently expanded at its base. Tooth and apophysis thrust forward together. Oesophagus tubular, one-fourth as wide as the neck, widening gradually in the posterior third to half as wide as the neck. Oesophageal tube not passing through the tooth. Intestine joining the middle of the posterior surface of the oesophageal swelling. Supplementary organs two, one in front of the other, mammiform, opposite the posterior half of the spicula. Spicula one and one-half times as long as the anal body diameter, tapering slightly, rather blunt; proximal ends cephalated by constriction. Flemming to glycerine. Resembles *Chaolaimus*, Cobb.

Habitat; distribution. This species from the roots of pasture plants, Arlington; citrus roots, Valencia, Spain. A widespread genus.

7. *Nemonchus galeatus*, n.g., n.sp.

$$\left( \begin{array}{ccccccc} 1.3 & 7.5 & 11.6 & -54 & 95.9 & & \\ :8 & 1. & 1.3 & 1.5 & 1. & 1.5 & \text{mm.} \end{array} \right.$$

$$\left( \begin{array}{ccccccc} 1.8 & 6.7 & 12.5 & -M & 99.6 & & \\ :1.4 & 1.2 & 2.1 & 2.2 & 1.4 & 1.3 & \text{mm.} \end{array} \right.$$

Lips connate, amphids unknown. Spear relatively massive, four times as long as the head is wide; anterior portion about one-sixth as wide as the head,

somewhat more distinctly chitinized than posterior two-fifths which is twice

as wide. Bulb of spear two-fifths as wide as the corresponding portion of the neck. Median bulb ellipsoidal, two-thirds as wide as the neck. No supplementary organs or special male papillae. Spicula about three times as long as the anal body diameter extending nearly straight forward, but slightly arcuate, and tapering in the distal third to the blunt, somewhat cephalated tips; proximal two-thirds uniform, one-fourth as wide as the corresponding portion of the body. Flemming to glycerine.

Habitat; distribution. A single species from Arlington.

8. *Isonchus radicolus*, n.g., n.sp.

⊜	1.9	6.5/-	10.1	-77	95.6	1.1 mm.
	1.8	2.6	2.8	3.	1.9	
⊜	2.2	10.3/-	11.8	-M	96.5	.8 mm.
	1.9	3.1	3.1	3.8	2.5	

Wing single. Spear simple, minute, with double guide, somewhat wider than one of the adjacent annules. Prolate median bulb, two-thirds as wide as

the neck. Posterior swelling fully half as wide as neck, ending indefinitely. No male supplementary organs or papillae. Spicula tapering, one and one-half times as long as the anal body diameter; proximal ends cephalated by constriction. Accessory piece parallel, half as long. Bursa extending from opposite the proximal ends of the spicula to terminus; one rib barely in front of the anus; four others together toward the terminus, all smaller, especially the final. Female tail with two terminal innervations. Bursa with ribs more numerous and more strongly developed than in *Tylenchus*. Flemming to glycerine.

Habitat; distribution. Single species from soil about the roots of cotton plants, Springfield, South Carolina.

9. *Discolaimus texanus*, n.g., n.sp.

⊜c	.5	8.2	24.1	'41 <sup>20</sup>	97.9	1.3 mm.
	1.4	2.6	3.	3.2	1.9	

Lips connate, palmately innervated, margin crenate. Papillae several to each lip. Amphids half as wide as the corresponding part of the head, apparently connected with lateral series of spaced ellipsoidal internal structures extending from end to end of the body. Spear tapering, rather stout, about as long as the lip region is wide, with single guiding-ring. Posterior three-fifths of the oesophagus, two-thirds as wide as the neck; lining very distinct. All the characters of *Dorylaimus*, but with the lip-region strongly modified to form a mobile sucking disk for use in opposition to the spear. Flemming to glycerine.

Habitat; distribution. The present species from the roots of alfalfa, San Antonio, Texas, and from roots of citrus trees, Riverside, California. Widespread genus, known to the writer from the West Indies, Texas, California, Japan and Europe.

10. *Actinolaimus radiatus*, n.g., n.sp.

⊜c	.3	6.4	19.	'29'	93.	3.9 mm.
	.9	1.5	1.7	2.	1.4	
⊜c	.9	13.	41.	-M-	99.7	4.1 mm.
	1.8	3.	3.6	2.	1.4	

Amphids about one-third as wide as the head. Pharynx as deep as head is wide, lined with six radiating grooved, strong, chitinous ribs. Mouth opening circular, half as wide as the head, very finely corrugated, leading to the cup-shaped pharynx. Spear somewhat longer than the head is wide, one-fifth as wide as the head, with



single, distinct, guiding ring. Oesophagus widening considerably in front of the middle to three-fourths as wide as the neck. First fascicle of nine supplementary organs about twice as far in front of the anus as the proximal ends of the spicula; second fascicle of about five, about twice as far from the anus as the first; third fascicle of two still farther forward; the larger fascicles one-fourth as long as the body is wide. Spicula faintly constricted in the middle, tapering both ways; not cephalated; twice as long as the anal body diameter. Flemming to glycerine.

Habitat; distribution. Roots of plants and among algae, Potomac River and its banks, Arlington Farm near Washington, D. C.; Douglas Lake, Mich. Genus represented in all parts of the world, and proposed for the reception of species similar to the writer's *Dorylaimus labyrinthostomus*, in which the pharynx is more or less immobile, radially striated and elaborately constructed. *Dorylaimus labyrinthostomus*, Cobb, thus becomes *Actinolaimus labyrinthostomus* (Cobb).

11. *Antholaimus truncatus*, n.g., n.sp.

$\{ = \frac{.8}{1.5} \dots \frac{8.}{3.5} \dots \frac{29.}{4.1} \dots \frac{49^{24}}{3.8} \dots \frac{99.}{2.6} \dots 1.5 \text{ mm.}$  Lips angular. Amphids unknown. Spear small, nearly as long as the lip region is wide. Pharynx cup-shaped, then fitting the spear. Oesophagus very narrow, very suddenly enlarging a little in front of the middle to three-fourths the width of the neck; lining unusually massive. Chain of contiguous circular organs throughout the length of the body in the lateral fields, one-fourth to one-third as wide as the body. Characters of *Dorylaimus*, but with the lips petaloid and strongly developed, and specially modified and mobile. Flemming to glycerine.

Habitat; distribution. A single species from the roots of cotton plants, South Carolina.

12. *Dorylaimellus virginianus*, n.g., n.sp.

$\{ = c \frac{.3}{.6} \dots \frac{5.8}{1.4} \dots \frac{26.}{1.8} \dots \frac{52^1}{1.9} \dots \frac{96.3}{1.4} \dots 1.5 \text{ mm.}$  Head set off by a narrow constriction. Lips connate, rounded; one set of papillae near the mouth opening, the other on the margin of the head. Amphids three-

$\{ = c \frac{.4}{.7} \dots \frac{6.4}{1.5} \dots \frac{24.3}{1.8} \dots \frac{-M-}{1.8} \dots \frac{96.5}{1.5} \dots 1.4 \text{ mm.}$

fourths as wide as the head. Spear *Dorylaimoid*, compound; first and second sections of equal length, each a little shorter than the head is wide; third section a little longer, expanded, faintly chitinized; followed by a short constriction, and then a rudimentary, elongated, ellipsoidal oesophageal bulb one-third as wide as the corresponding portion of the neck. Posterior half of the oesophagus three-fifths as wide as the neck. Supplementary organs in isolated pairs located one in front of the other, one pair as far from the anus as is the terminus, the other twice as far, all flattish-conoid. Spicula as long as the anal body diameter; plump, strongly tapering, bent at the middle, cephalated by expansion, without accessory pieces. Flemming to glycerine.

Habitat; distribution. A single species from Arlington.

13. *Nygolaimus pachydermatus*, n.g., n.sp.

{= c  $\frac{.6}{1.1} \dots \frac{7.7}{1.9} \dots \frac{22.}{2.4} \dots \frac{.66}{2.5} \dots \frac{98.}{1.9}$  1.8 mm. Measurements derived from a young specimen. Cuticle thicker on the tail. Lips connate, set off by constriction. Amphids half as wide as the corresponding part of the head. Spear half as long as the head is wide, conical, slender, pointed, tooth-like; without guiding-ring. Posterior half of the oesophagus enlarged to three-fourths the width of the neck. Flemming to glycerine.

Habitat; distribution. A single species from roots of cherry trees, Tokyo, Japan. Other species occur in Eastern United States.

14. *Trichodorus obtusus*, n.g., n.sp.

{= c  $\frac{1.4}{1.9} \frac{(8.)}{(3.3)} \frac{11.}{3.6} \frac{22.}{4.1} \frac{.54^{35}}{4.7} \frac{99.6}{2.3}$  1. mm. Papillae flattish-conoid, outward pointing, on margin of head. Amphids nearly half as wide as the head.

{= c  $\frac{1.1}{1.3} \frac{(8.)}{(3.3)} \frac{10.}{3.4} \frac{17.}{3.9} \frac{-M}{4.4} \frac{98.5}{2.8}$  1.1 mm. Pharynx exceedingly narrow. Spear flexible, exceedingly slender, inclosed in a long muscular sheath. Oesophagus mainly narrow and tubular, about one-sixth as wide as the neck. Supplementary organs three, flattish-conoid, distinctly interrupting the ventral contour; the hindermost opposite the proximal ends of the spicula; the second twice as far from the anus as the first; third nearly twice as far from the anus as the second. Spicula slender, uniform; proximal ends cephalated by expansion. Flemming to glycerine. The measurements in parentheses are taken at the base of the spear.

Habitat; distribution. Several species from various parts of the United States, the present one from about the roots of grasses, Arlington.

15. *Achromadora* n.g. *minima* (Cobb)

{> o  $\frac{2.8}{2.5} \frac{?}{?} \frac{17.}{2.9} \frac{.45'}{4.4} \frac{87.}{2.8}$  .51 mm. Habitat; distribution. Genus proposed for the reception of the writer's

*Chromadore minima*, and similar soil and fresh-water species. Distinguished from *Chromadore* by the presence of well developed spiral amphids. The dorsal tooth is farther back and is opposed by a small ventral "pocket" as shown in the figure of *Chromadore minima*. Measured fresh. Species found, probably, in all parts of the world. Species are known to the writer from Australia, Fiji, and various parts of the United States.

16. *Cryptonchus nudus*, n.g., n.sp.

{= c  $\frac{3.2}{1.4} \frac{9.2}{1.7} \frac{26.}{2.} \frac{.54^{14}}{2.2} \frac{91.}{1.5}$  > 1.9 mm. Striae resolvable with difficulty, and into rows of dots. Lips six, rather

inconspicuous, each with one papilla. Amphids as wide as pharynx, about one-fourth as wide as the corresponding portion of the neck; located opposite the junction of the first and second quarters of the pharynx. Oesophagus plain, half as wide as neck, lining relatively massive. Eggs elongated. Hot sublimate to balsam and Flemming to glycerine. Caudal gland apparently a single cell.

Habitat; distribution. Single species. Differs from *Cylindrolaimus* in the form of the amphids, and the strongly developed oesophagus with its various regions, and in the presence of a dorsal tooth at the base of the pharynx and in the absence of setae. Found about the roots of aquatic plants, Potomac River, Arlington and in Douglas Lake, Mich.

17. *Nannonchus granulatus*, n.g., n.sp.

$\left\{ \begin{array}{l} \text{♀} \\ \text{♂} \end{array} \right. \supseteq \begin{array}{cccccc} 1.4 & 9.3 & 17. & 52^{22} & 91. & \\ 1.8 & 3. & 3.4 & 4.3 & 2.5 & \end{array} \supset 1.1 \text{ mm.}$   
 $\left\{ \begin{array}{l} \text{♀} \\ \text{♂} \end{array} \right. \supseteq \begin{array}{cccccc} 1.3 & 8.7 & 15. & M & 82. & \\ 2. & 2.9 & 3.3 & 3.6 & 2.5 & \end{array} \supset 1.3 \text{ mm.}$

Head continuous. Lips six, thin, arched over pharynx, each with one papilla. Spiral amphids of two winds, one-fourth as wide as the head. Oesophagus two-thirds as wide as the head; finally expanding to two-fifths as wide as the base of the neck; lining very distinct. Eggs ellipsoidal, as long as the body is wide. No supplementary male organs or papillae; about seven finger-shaped ventrally submedian setae on the anterior two-thirds of the tail. Spicula tapering, nearly straight, somewhat longer than the anal body diameter, accompanied by a relatively massive accessory piece, parallel to and two-thirds as long as themselves. Distal end of accessory piece expanded laterally, and relatively massive. Flemming to glycerine.

Habitat; distribution. A single species found about roots of aquatic plants, Potomac River, Arlington. Another similar species, Long Key, Fla.

18. *Oionchus obtusus*, n.g., n.sp.

$\left\{ \begin{array}{l} \text{♀} \\ \text{♂} \end{array} \right. \supseteq \begin{array}{cccccc} 2.6 & 7.6 & 23. & 57^{15} & 98. & \\ 2.5 & 3.6 & 4.6 & 4.2 & 2.9 & \end{array} \supset .9 \text{ mm.}$

Neck conoid, convex-conoid at the head. Lips confluent; region low, flat. Amphids at the slight labial constriction; one-fourth as wide as the lip region. Pharynx narrow; cylindrical or prismoid. Somewhat arcuate dorsal tooth, like a short Dorylaimoid spear, but not hollow. Oesophagus beginning two-fifths as wide as the head, almost imperceptibly expanding to the middle; thence cylindrical, and one-half as wide as the neck; three small organs at base, as in *Trilobus*. Lining very distinct. Peculiar series of four small internal lateral organs just behind the neck. Terminus of tail with peculiar large pore, presumably a peculiar spinneret pore. Eggs elongated. Flemming to glycerine.

Habitat; distribution. About the roots of grass, borders of irrigation ditch, Jamaica, West Indies.

19. *Udonchus tenuicaudatus*, n.g., n.sp.

$\left\{ \begin{array}{l} \text{♀} \\ \text{♂} \end{array} \right. \supseteq \begin{array}{cccccc} 1.9 & 8.4 & 16. & 51^{25} & 68. & \\ 2.3 & 3.2 & 3.6 & 3.6 & 2.6 & \end{array} \supset .5 \text{ mm.}$

Traces of labial papillae. Amphids transverse, ellipsoidal, one-fifth as long as the corresponding diameter of the neck. Pharynx cyathiform, then narrow, with small, acute, narrow, forward-pointing dorsal tooth at the base of cyathiform portion, opposed by a very minute ventral tooth. Anterior two-fifths of the oesophagus three-fifths as wide as head, then suddenly slightly increasing in diameter, so that at the nerve-ring it is half as wide as the neck; enlarging finally into a spherical bulb with simple valve. Thin-shelled eggs, elongated, one at a time in the uterus. Flemming to glycerine.

Habitat; distribution. On aquatic plants and among algae, Cockpit Springs, Jamaica, West Indies.

20. *Diploscapter* n.g. *coronata* (Cobb)

$\left\{ \begin{array}{l} \text{♀} \\ \text{♂} \end{array} \right. \supseteq \begin{array}{cccccc} 4.5 & 16.5 & 24.2 & 55 & 89.5 & \\ 4. & 5.4 & 6.1 & 6.3 & 2.8 & \end{array} \supset .4 \text{ mm.}$   
 $\left\{ \begin{array}{l} \text{♀} \\ \text{♂} \end{array} \right. \supseteq \begin{array}{cccccc} 6.2 & 18. & 27. & M & 94. & \\ 4.5 & 5.9 & 6.9 & 7.1 & 5.2 & \end{array} \supset .26 - .35 \text{ mm.}$

Habitat; distribution. Common about the roots of diseased plants, especially in warm countries. Genus established to receive the writer's *Rhabditis*

*coronata*. Flemming to glycerine. This species occurs in Fiji, Panama, Europe, Africa, and the United States. Possibly more than one species may be represented in the descriptions of the various authors who have reported upon *Rhabditis coronata*, or, as now proposed, *Diploscapter coronata*.

21. *Haliplectus pellucidus*, n.g., n.sp.

(= o	.5	7.3	11.6	'43 <sup>29</sup>	95.2	1. mm.
	1.1	2.5	2.7	3.1	2.3	
(= o	.5	6.8	11.	-M <sup>65</sup>	95.7	1. mm.
	1.	2.4	2.6	2.9	2.6	

Head end markedly convex-conoid, finally truncated; no cephalic setae. Pharynx apparently absent, really present and narrow. Amphids circular, one-third as wide,

as corresponding part of neck; located one-third the distance to the median bulb. Oesophagus one-half as wide as the head, to the relatively small ellipsoidal median bulb, which is two-fifths as wide as the middle of the neck. Cardiac bulb oblate, five-sixths as wide as neck, with rather simple, elongated ellipsoidal striated valve. Opposite the spicula a ventral row of six small somewhat hemispherical, equidistant, contiguous, innervated supplementary organs. Post-anal flattish, inconspicuous papillae to the number of about six on each side,—two ventrally submedian on the anterior half, and four subventral, rather evenly distributed. Spicula arcuate, uniform, yellowish, one and one-fifth times as long as the anal body-diameter; proximal ends plain. Accessory piece yellow, more or less parallel, half as long. Hot sublimate to balsam.

Habitat; distribution. Found in brackish and sometimes in fresh water in the Eastern States. Several species found on the Atlantic and Pacific coasts of the United States.

22. *Wilsonema cephalatum*, n.g., n.sp.

⊃= o	4.1	17.	23.	'52 <sup>1</sup>	92.	.3 mm.
	3.9	5.	5.7	7.1	3.2	

Habitat; distribution. Genus proposed for the reception of species similar to

*Plectus otophorus*, de Man, *Plectus auriculatus*, Bütschli, and *Plectus cephalatus*, Cobb. This genus is doubtless worldwide in its distribution. Known to the writer from Australia, North America and Europe. Flemming to glycerine. Species probably fairly numerous and individuals of certain species very widespread. The present remarkable species is widespread in the United States, in arable soils.

Named in honor of James Wilson, for sixteen years Secretary of Agriculture of the United States.

23. *Gymnolaimus* n. g. *exilis* (Cobb)

(=	4.5	7.5	23.	-46 <sup>14</sup>	73.	1.07 mm.
	1.6	1.9	2.1	2.	1.	

Habitat; distribution. Genus proposed for the writer's *Aulolaimus exilis*, from Fiji. Differs from *Cylindrolaimus* in absence of amphids, caudal glands and cephalic setae. Measured fresh.

24. *Chronogaster gracilis*, n.g., n.sp.

⊃= o	1.5	11.	25.	'56 <sup>21</sup>	89.	1.2 mm.
	1.2	2.3	2.6	3.	1.6	
⊃= o	1.2	12.1	25.1	-M <sup>46</sup>	92.7	1.1 mm.
	.9	1.9	2.2	2.4	1.9	

Striae about 650. Lips three, somewhat confluent. Amphids half as wide as head. Pharynx as deep as the head is wide, one-third as wide as the lip region.

Oesophagus half as wide as the neck. Cardiac bulb three-fourths as wide as the neck, joined to the intestine by a slender ampulla as long as the neck is wide. Eggs elongated, one at a time in the uterus. Spinneret with about four finger-shaped, rather backward pointing setae, each not much longer than the width of one of the adjacent annules. Spicula slender, tapering, acute, barely cephalated, one and one-half times as long as the anal body diameter. Supplementary organs nine, oblique, tubular, arcuate, protrudable, half to four-fifths as long as the body is wide, occupying a distance twice as great as the length of the tail, smaller and more amply spaced anteriorly, hindermost opposite the proximal ends of the spicula. Hot sublimate to balsam.

Habitat; distribution. Potomac River, near Washington, D. C. Douglas Lake, Mich.

25. *Anonchus monohystera*, n.g., n.sp.

$\zeta = \circ \frac{1.4}{2.1} \dots \frac{8.2}{3.} \dots \frac{17.}{3.4} \dots \frac{50^{23}}{4.5} \dots \frac{85.}{2.4} \rightarrow 1. \text{ mm.}$

$\zeta = \circ \frac{1.}{2.1} \dots \frac{8.6}{3.} \dots \frac{16.}{3.3} \dots \frac{M}{2.9} \dots \frac{86.}{2.9} \rightarrow 1. \text{ mm.}$

Striae about 500. About forty internal ellipsoidal bodies in each lateral field, spaced, in two series.

No cephalic papillae. Amphid one-fifth as wide as head. Pharynx half

as wide as head; about as deep as wide. Oesophagus nearly half as wide as the neck, joined to the intestine by a narrow cardia as long as the neck is wide. Twenty tubular supplementary organs, each one-third as long as the body is wide, extending from the anus to the middle of the body, and continued to the head by a series of about seventy minute depressions. Four to five well developed ventral, sublateral setae on the tail, one in front of the anus. Spicula slender, twice as long as the anal body diameter; proximal ends slightly cephalated by expansion, accompanied by accessory piece near the anus and extending inward and slightly backward. Hot sublimate to balsam.

Habitat; distribution. Potomac River, near Washington, D. C. Douglas Lake, Mich.

26. *Trischistoma pellucida*, n.g., n.sp.

$\zeta = \circ \frac{1.8}{2.} \dots \frac{9.1}{2.5} \dots \frac{22.}{2.6} \dots \frac{80^{23}}{2.6} \dots \frac{92.}{2.1} \rightarrow .6 \text{ mm.}$

Cuticle naked, plain. Head continuous. Pharynx unarmed. Oesophagus two-thirds as wide as neck. Cardia rather cylindrical, two-thirds as long as the diameter of the neck. Tail terminus one-sixth as wide as the base of the tail; apiculate by what appears to be a very minute spinneret. Flemming to glycerine.

Habitat; distribution. Roots of sugar cane, Jamaica, West Indies. Resembles *Trilobus* Bastian. There is an European species.

*Errata.* On p. 434 *Trichodora* should read *Trichodoros*.

“ “ 435 *T. obtura* should read *T. obturus*.